

## CLAIMS

What is claimed is:

- 1           1. A medical device for delivering a medicament to a patient,
- 2 comprising:
- 3           a syringe assembly comprising:
  - 4           a barrel having a forward end and a rear end and defining a
  - 5 reservoir within which the medicament may be contained;
  - 6           a needle cannula having a forward tip and being coupled to said
  - 7 forward end of said barrel and in fluid communication with said reservoir; and
  - 8           a plunger having a first end with a stopper positioned in said
  - 9 reservoir and a second end having a thumb pad for receiving medicament delivery
  - 10 pressure for causing said plunger to move within said reservoir to cause the
  - 11 medicament to be expelled from said reservoir;
  - 12           a shield releasably mounted on a front portion of said barrel at a first
  - 13 position; and
  - 14           an urging member for urging said shield in a forward direction relative to
  - 15 said syringe assembly, said shield being movable from said first position to a second
  - 16 position against the urgency of said urging member when said needle cannula is
  - 17 inserted into a patient for delivery of the medicament and said shield being moveable
  - 18 from said second position to a third position by the urgency of said urging member upon
  - 19 removal of said needle cannula from said patient, wherein said forward tip of said
  - 20 needle cannula is covered by said shield when said shield is in said third position.

1                   2. The medical device of claim 1, further comprising means for  
2 preventing said shield from moving back to said first position after said shield is moved  
3 to said second position.

1                   3. The medical device of claim 1, wherein one of said shield and said  
2 barrel defines a track arrangement having an entry track and a lock-out track, said entry  
3 track and said lock-out track being joined at an intersection, and the other of said shield  
4 and said barrel includes a pin guidable in said track arrangement.

1                   4. The medical device of claim 3, wherein said pin is guided in said  
2 entry track when said shield moves from said first position to said second position.

1                   5. The medical device of claim 4, wherein said pin is guided in said  
2 lock-out track when said shield moves from said second position to said third position.

1                   6. The medical device of claim 3, wherein said other of said shield and  
2 said barrel further comprises a resilient lever arm having a free end, said pin being  
3 arranged proximate said free end of said lever arm.

1                   7. The medical device of claim 6, wherein said one of said shield and  
2 said barrel further comprises a blocking element arranged in said entry track proximate

3 said intersection, said blocking element having a blocking surface facing said lock-out  
4 track for blocking reentry of said pin into said entry track from said lock-out track.

1               8. The medical device of claim 7, wherein said blocking element  
2 further comprises an inclined surface facing said entry track, said pin sliding over said  
3 inclined surface and bending said resilient lever as said pin slides over said inclined  
4 surface, thereby allowing movement of said shield from said entry track toward said  
5 lock-out track.

1               9. The medical device of claim 3, wherein said one of said shield and  
2 barrel comprises a locking device for locking the shield in said third position.

1               10. The medical device of claim 9, wherein said lock-out track is  
2 defined between first and second end surfaces at first and second end areas thereof,  
3 said pin being guided toward said first end when said shield is moved toward said third  
4 position, said locking device comprising a one-way step arranged proximate said first  
5 end of said lock-out track such that said pin is arranged between said one-way step and  
6 said first end surface when said shield is in said third position.

1               11. The medical device of claim 10, wherein said one-way step  
2 comprises a blocking surface facing said first end area of said lock-out track, said

3 blocking surface preventing said pin from moving from said first end toward said second  
4 end and thereby locking said shield in said third position.

1               12. The medical device of claim 11, wherein said one-way step  
2 comprises an inclined surface facing said second end of said lock-out track, said pin  
3 sliding over said inclined surface and bending said resilient lever as said pin slides over  
4 said inclined surface, thereby allowing movement of said shield toward said first end of  
5 said lock-out track.

1               13. The medical device of claim 3, wherein one of said entry track and  
2 said lock-out track extends parallel to a longitudinal axis of said medical device.

1               14. The medical device of claim 13, wherein said lock-out track extends  
2 parallel to the longitudinal axis of said medical device and said entry track extends at  
3 least partially in the circumferential direction such that the shield rotates as the shield  
4 moves from said first position to said second position.

1               15. The medical device of claim 13, wherein said entry track extends  
2 parallel to the longitudinal axis of said medical device and said lock-out track extends at  
3 least partially in the circumferential direction such that the shield rotates about the  
4 longitudinal axis as the shield moves from said second position to said third position.

1           16. The medical device of claim 3, wherein said lock-out track has two  
2 ends, said entry track intersecting said lock-out track at a location between said two  
3 ends of said lock-out track.

1           17. The medical device of claim 1, wherein said urging member is a  
2 spring.

1           18. The medical device of claim 1, wherein said barrel is plastic.

1           19. The medical device of claim 1, wherein said barrel is glass.

1           20. The medical device of claim 3, wherein said barrel comprises a  
2 cylindrical portion extending forward of said reservoir, said cylindrical portion defining  
3 said track arrangement.

1           21. The medical device of claim 20, wherein said cylindrical portion is  
2 formed unitarily with said barrel.

1           22. The medical device of claim 20, wherein said cylindrical portion is  
2 plastic and a remainder of said barrel is glass.

1               23. The medical device of claim 3, wherein said pin comprises a radial  
2 projection.

1               24. The medical device of claim 3, wherein said one of said shield and  
2 said barrel comprises two of said track arrangements arranged on opposing sides of  
3 said one of said shield and said barrel and the other of said shield and said barrel  
4 comprises two pins guidably inserted in respective ones of said two track arrangements.

1               25. A combination comprising a medical syringe and a safety shield  
2 assembly, said medical syringe comprising a barrel having a forward end and a rear  
3 end and defining a reservoir within which the medicament may be contained, a needle  
4 cannula having a forward tip and being coupled to said forward end of said barrel and in  
5 fluid communication with said reservoir, and a plunger having a first end with a stopper  
6 positioned in said reservoir and a second end having a thumb pad for receiving  
7 medicament delivery pressure for causing said plunger to move within said reservoir to  
8 cause the medicament to be expelled from said reservoir; and

9               said safety shield assembly comprising a shield releasably mounted on a  
10 front portion of said barrel at a first position, and an urging member for urging said  
11 shield in a forward direction relative to said barrel, said shield being movable from said  
12 first position to a second position against the urgency of said urging member when said  
13 needle cannula is inserted into a patient for delivery of the medicament and said shield  
14 being moveable from said second position to a third position by the urgency of said

15 urging member upon removal of said needle cannula from said patient, wherein said  
16 forward tip of said needle cannula is covered by said shield when said shield is in said  
17 third position.

1                   26. The combination of claim 25, wherein one of said shield and said  
2 barrel defines a track arrangement having an entry track and a lock-out track, said entry  
3 track and said lock-out track being joined at an intersection, and the other of said shield  
4 and said barrel includes a radial projection guidably inserted in said track arrangement.

1                   27. The combination of claim 25, wherein said barrel is plastic.

1                   28. The combination of claim 25, wherein said barrel is glass.

1                   29. The combination of claim 25, wherein said barrel comprises a  
2 cylindrical portion extending forward of said reservoir, said cylindrical portion defining  
3 said track arrangement.

1                   30. The combination of claim 29, wherein said cylindrical portion is  
2 formed unitarily with said barrel.

1                   31. The combination of claim 29, wherein said cylindrical portion is  
2 plastic and the remainder of said barrel is glass.

1                   32. A shield assembly for connection to a syringe barrel for preventing  
2 inadvertent needle sticks after use of the syringe, the shield system comprising a  
3 cylindrical portion connectable to a front end of the syringe barrel, a shield releasably  
4 mounted on said cylindrical portion at a first position, and an urging member for urging  
5 said shield in a forward direction relative to the syringe barrel, said shield being movable  
6 from said first position to a second position against the urgency of said urging member  
7 when a needle cannula of the syringe is inserted into a patient for delivery of the  
8 medicament and said shield being moveable from said second position to a third  
9 position by the urgency of said urging member upon removal of the needle cannula from  
10 the patient to cover the tip of the needle cannula connected to the forward end of the  
11 syringe barrel.

1                   33. The shield assembly of claim 32, further comprising means for  
2 preventing said shield from moving back to said first position after said shield is moved  
3 to said second position.

1                   34. The shield assembly of claim 32, wherein one of said shield and  
2 said cylindrical portion defines a track arrangement having an entry track and a lock-out  
3 track, said entry track and said lock-out track being joined at an intersection, and the  
4 other of said shield and said cylindrical portion includes a pin guidably inserted in said  
5 track arrangement.

1               35. The shield assembly of claim 34, wherein said pin is guided in said  
2 entry track when said shield moves from said first position to said second position.

1               36. The shield assembly of claim 35, wherein said pin is guided in said  
2 lock-out track when said shield moves from said second position to said third position.

1               37. The shield assembly of claim 34, wherein said other of said shield  
2 and said cylindrical portion further comprises a resilient lever arm having a free end,  
3 said pin being arranged proximate said free end of said lever arm.

1               38. The shield assembly of claim 37, wherein said one of said shield  
2 and said cylindrical portion further comprises a blocking element arranged in said entry  
3 track proximate said intersection, said blocking element having a blocking surface  
4 facing said lock-out track for blocking reentry of said pin into said entry track from said  
5 lock-out track.

1               39. The medical device of claim 34, wherein one of said entry track and  
2 said lock-out track extends parallel to a longitudinal axis of said medical device.

1               40. The medical device of claim 39, wherein said lock-out track extends  
2 parallel to said longitudinal axis of said medical device and said entry track extends at

3 least partially in the circumferential direction such that the shield rotates as the shield  
4 moves from said first position to said second position.

1                  41. The medical device of claim 39, wherein said entry track extends  
2 parallel to said longitudinal axis of said medical device and said lock-out track extends  
3 at least partially in the circumferential direction such that the shield rotates as the shield  
4 moves from said second position to said third position.

1                  42. The medical device of claim 34, wherein said lock-out track has two  
2 ends, said entry track intersecting said lock-out track at a location between said two  
3 ends of said lock-out track.

1                  43. A medical device for delivering a medicament to a patient,  
2 comprising:  
3                  a syringe assembly comprising:  
4                  a barrel having a forward end and a rear end and defining a  
5 reservoir within which the medicament may be contained;  
6                  a needle cannula having a forward tip and being coupled to said  
7 forward end of said barrel and in fluid communication with said reservoir; and  
8                  a plunger having a first end with a stopper positioned in said  
9 reservoir and a second end having a thumb pad for receiving medicament delivery

10 pressure for causing said plunger to move within said reservoir to cause the  
11 medicament to be expelled from said reservoir;

12                 a shield releasably mounted on a front portion of said barrel at a first  
13 position;

14                 means for urging said shield in a forward direction relative to said syringe  
15 assembly;

16                 means for retaining said shield in said first position;

17                 means for allowing movement of said shield from said first position to a  
18 second position against the urgency of said urging member when said needle cannula  
19 is inserted into a patient for delivery of the medicament; and

20                 means for allowing movement of said shield from said second position to a  
21 third position by the urgency of said means for urging upon removal of said needle  
22 cannula from said patient, wherein said forward tip of said needle cannula is covered by  
23 said shield when said shield is in said third position.